SECTION F

STUDENT IDENTIFICATION NUMBER

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Tests
D-2
Math 30
1969

HIGH SCHOOL AND UNIVERSITY MATRICULATION
EXAMINATIONS BOARD

DEPARTMENTAL EXAMINATIONS, 1969

13

MATHEMATICS 30

Time — 2 hours.

Total Possible Mark — 105.

NOTE — Answers to Section A (Questions 1 - 22) are to be recorded on the separate ANSWER SHEET provided.
Answers to Section B (Questions 33 - 34) must be done in this booklet. Rough work may be done in pencil, finished work must be done in blue or black ink (pen or ballpoint). Knott's Mathematical Tables may be used and these tables will be supplied by the Presiding Examiner. Candidates are NOT permitted to use slide rules.

PLEASE REFER TO PAGE 2 FOR INSTRUCTION RE COMPLETION OF ANSWER SHEET.

To ensure accuracy in the handling of your examination booklet, Section E below, and Section F above, MUST BE COMPLETED in the following manner:

SECTION E — *Step (1)* *Carefully check label.* Notify the presiding examiner if the name on the label does not correspond to your name.

Step (2) Place label into the dotted box.

Step (3) Indicate your name, mailing address and birth date whether or not you have a label.

SECTION F — From the label, write your student number in the area designated. IF NO LABEL HAS BEEN PROVIDED, omit Section F.

Machine Score
Book Score
TOTAL

(For the use of the Department only)

PLACE
RED
SEAL
HERE

DO NOT FOLD EITHER THE ANSWER SHEET OR THE TEST BOOKLET.

Your presiding examiner will collect the answer sheet and booklet separately for transmission to the Department.

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D419
1969
math.30
CURR HIST

Place label in dotted box

SECTION E

The following information must be given:

Name ....
Surname Christian Names

Mailing Address ....
City, Town, Village

Birth Date ....
Day Month Year

To ensure accuracy in the handling of your examination papers, the following sections on your answer sheet MUST BE COMPLETED.

SECTION A — Supply information as requested.

SECTION B — *Step (1)* *Carefully check label.* Notify the presiding examiner if the name on the label does not correspond to your name.

Step (2) Place label into the dotted box.

Step (3) Indicate your name, mailing address and birth date whether or not you have a label.

SECTION C — Supply information as requested.

SECTION D — *Step (1)* From the label, write your student number into the column of blank boxes in Section D. Begin by placing the left-most digit into the top box.

Step (2) For the digit you have placed into each box, blacken the appropriate guide line containing this digit.

IF NO LABEL HAS BEEN PROVIDED, omit Section D.

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SECTION A

Section A of the paper contains questions 1 - 32 inclusive. Answers to these questions are to be recorded on the separate ANSWER SHEET which will be given to you by the Presiding Examiner. Each question has four suggested answers of which only one is correct. Select the correct answer in each case and record your choice on the separate ANSWER SHEET provided as shown in the example below. There is no penalty for incorrect answers.

EXAMPLE

The product of
8 and 12 is

ANSWERS

A. 20
B. 96
C. 48
D. 72

ANSWER SHEET

A	B	C	D	E
┅	▬	┅	┅	┅

DISREGARD COLUMN "E"
ON ANSWER SHEET

You are to use ORDINARY HB PENCIL. Make certain your answer marks are heavy and black. If you change your mind about an answer, be sure to completely erase your first mark. There should be only one answer marked for each question. The ANSWER SHEET will be machine scored; consequently, candidates should insure that no stray pencil marks appear on the ANSWER SHEET.

SECTION B

Section B of this paper consists of questions 33 - 44 inclusive. Complete solutions for each question should be shown in the spaces provided in the booklet. Some marks may be obtained for partial solutions. DO NOT put work which is to be read by the sub-examiner in the ROUGH WORK ONLY column. Finished work in this section may be done in either pencil or ink (blue or black).

SECTION A

Questions 1 to 32 inclusive have a value of 2 marks each. In each case, select the CORRECT ANSWER and record your choice on the separate answer sheet that has been provided.

1. Given that $Q \rightarrow P$ is a false statement, which is the correct truth value entry in the table?

	Q	P	Q∨P	P∧Q
A.	T	F	T	T
B.	F	T	T	F
C.	T	F	F	F
D.	T	F	T	F

2. Select the correctly quantified statement below.

A. $\forall x, x \in R, x + 2 > 5$
B. $\exists x, x \in {}^{-}I, x - 1 > 2$
C. $\forall x, x \in \mathrm{R}, 2x > 6$
D. $\exists x, x \in R, -2x < -6$

3. If $f: x \rightarrow 2^x, x \in R$, then the inverse function is

A. $f^{-1}: x \rightarrow x, x \in R$
B. $f^{-1}: x \rightarrow \log_2 x, x > 0, x \in R$
C. $f^{-1}: x \rightarrow \frac{1}{2^x}, x \in R$
D. $f^{-1}: x \rightarrow \log_2 x, x \in R$

4. If $S = \{(x, y, z) \mid x < y < z < 0, x, y, z \in R$, which of the following statements is false?

A. $y - x > 0$
B. $xz < yz$
C. $xy > yz$
D. $xy > 0$

5. Given $A = \{a, b\}$ is the set of elements of an algebraic system and the operation * is defined by the table.

*	*a*	*b*
a	*a*	*b*
b	*b*	*a*

What is the inverse of each element under the operation * ?

A. *a*
B. *b*
C. It is impossible to tell from the data given
D. Each element is its own inverse

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FOR ROUGH WORK

(No marks given for work in this space)

6. The domain of the relation defined by $K = \{ (x, y) \mid x^2 - y^2 - 9 = 0, x, y \in R\}$ is

A. $\{ x \mid x \geqq 9, x \in R \}$

B. $\{ x \mid x \geqq 3, x \in R \}$

C. $\{ x \mid |x| \geqq 3, x \in R \}$

D. $\{ x \mid |x| \leqq 3, x \in R \}$

7. If $f(x) = x^2 + 2$, then the value of x for which $f(x) = f(2x + 1)$ are

A. $-\frac{1}{3}, 1$

B. $-3, -1$

C. $\frac{1}{3}, -1$

D. $-\frac{1}{3}, -1$

8. Given the table defining the linear function $f(x)$ as

x	5	11	x_1
$f(x)$	15	6	0

The value of x_1 is

A. $22\frac{1}{2}$
B. 10
C. 15
D. $23\frac{3}{4}$

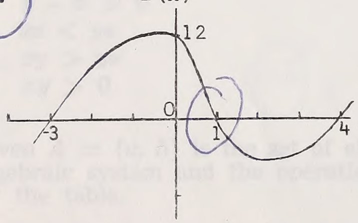
9. The maximum value of the function $16 - 2x - 5x^2$ is

A. −0.2
B. 16.2
C. −16.2
D. 15.8

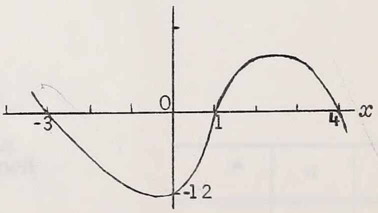
10. Given $f(x) = (1 - x)(x^2 - x - 12)$, then the sketch of the graph most closely corresponding to $f(x)$ is

⑰

[✓ A.]



B.



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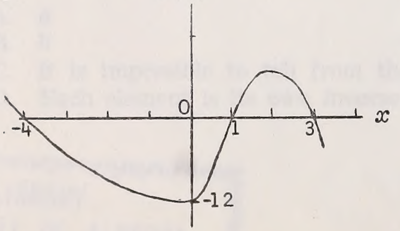

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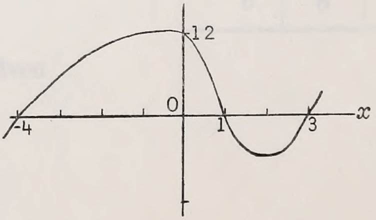


FOR ROUGH WORK

(No marks given for work in this space)

$(x-4)(x+3)$

11. If m and n are roots of the quadratic equation $12 + 5x - 2x^2 = 0$, then $m^3n^2 + m^2n^3$ has a value of

A. -75
B. -90
C. 45
D. 90

12. A recursive definition of a geometric sequence, f, such that $f_3 = 27$, $f_6 = -729$ is

A. $\begin{cases} f_1 = 3 \\ f_{n+1} = (-3)f_n \end{cases}$

B. $\begin{cases} f_1 = -3 \\ f_{n+1} = f_n + 3 \end{cases}$

C. $\begin{cases} f_1 = -3 \\ f_{n+1} = 3f_n \end{cases}$

D. $\begin{cases} f_1 = 3 \\ f_{n+1} = f_n - 3 \end{cases}$

13. The modulus of a complex number is the

A. distance of the point from the x-axis
B. distance of the point from the origin
C. distance of the point from the y-axis
D. identity element

14. The value of z in the equation $(-2 + 3i)z = 2 - 5i$, in standard form $a + bi$, is

A. $\frac{17}{13} + \frac{4}{13}i$

B. $\frac{-11}{13} - \frac{4}{13}i$

C. $\frac{-19}{13} - \frac{4}{13}i$

D. $\frac{-19}{13} + \frac{4}{13}i$

15. The simplified value of $\frac{1}{7}\sqrt{-245} - 3\sqrt{-28} - \frac{1}{3}\sqrt{-63}$ is

A. $(\sqrt{5} - 7\sqrt{7})i$

B. $\frac{1}{7}\sqrt{35}\sqrt{7}\cdot i + 7\sqrt{7}\cdot i$

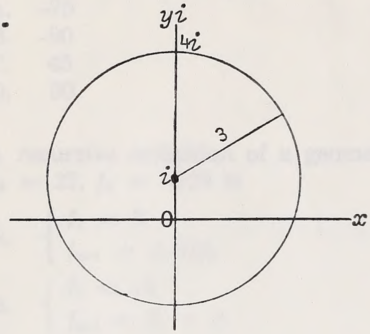
C. $(\sqrt{5} + 7\sqrt{7})i$

D. $\frac{1}{7}\sqrt{35}\sqrt{7} + 7\sqrt{7}$

FOR ROUGH WORK
(No marks given for work in this space)

16. The graph of the set $A = \{z \mid |z + i| = 3, z \in C\}$ is

A.



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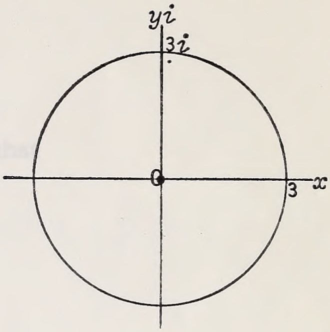

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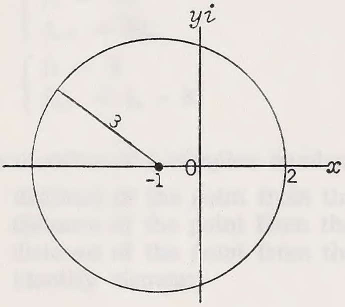
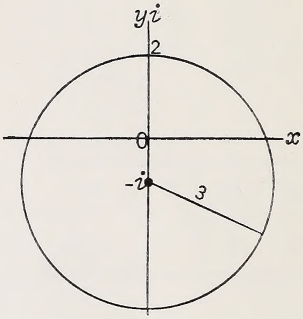


D.



17. The simplified value of $i + 2i^2 + 3i^3 + i^4$ is

A. $1 + 2i$
B. $-(1 + 2i)$
C. $1 - 2i$
D. $-(1 - 2i)$

18. The radius of the circle defined by $x^2 + y^2 - 8x + 6y + 9 = 0$ is

Geo

A. 4
B. 9
C. 16
D. 0

19. The length of the transverse axis of the hyperbole represented by $9x^2 - 16y^2 = -144$ is

Geo

A. 8
B. 6
C. 3
D. 4

20. The equation of the directrix for the parabola defined by $x^2 - 9y = 0$ is

Geo

A. $y = -\frac{9}{4}$

B. $x = -\frac{9}{4}$

C. $y = \frac{9}{4}$

D. $x = \frac{9}{4}$

FOR ROUGH WORK

(No marks given for work in this space)

21. Evaluate $b(3;\ 4,\ 0.1)$

A. 12

B. $\frac{7}{12}$

C. $\frac{36}{10000}$

D. $\frac{36}{1000}$

22. $\frac{n!}{(n-3)!\,3!}$ is equivalent to

A. $\frac{n!}{3}$

B. $\frac{n(n+1)(n+2)!}{2!}$

C. $\frac{n(n-1)(n-2)}{2!}$

[✓ D.] $\frac{n(n-1)(n-2)}{6}$

23. Eight people are to sit at a round table in which positions are indistinguishable. Three of the group are to sit together. The number of different ways of seating the group is

A. $\frac{6!}{3}$

B. $8! \times 6$

C. $5! \times 6$

D. $6! \times 3!$

24. A box of eight razor blades contains two defective blades. If two blades are drawn from the box at random, the probability that neither of them is defective is

A. $\frac{3}{4}$

B. $\frac{1}{4}$

C. $\frac{15}{28}$

D. $\frac{13}{28}$

$_8C_2 = \frac{\overset{4}{\cancel{8}} \times 7 \times 6!}{2! \times 6!} = \frac{6}{\cancel{28}} = \frac{3}{14}$

25. How many triangles are determined by the vertices of a regular 10-sided polygon?

A. 120

B. 35

C. 720

D. 240

26. The first three terms of the expansion of $(1 - 3x)^6$ are

A. $1 - 18x + 135x^2$

B. $1 - 18x + 45x^2$

C. $1 - 18x + 270x^2$

D. $1 - 18x + 135x^2$

FOR ROUGH WORK

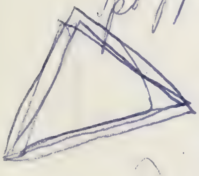
(No marks given for work in this space)

$5(2 \cdot 3)(2)(1)$

6

10-sided polygon

$$\frac{n(n-1)(n-2)(n-3)}{6}$$



[illegible] condition

$$\frac{(x^2-4)}{4} x^2$$

(5-7)

7:30

1:30

2-3

3-4

4-4:30

27. How many three-digit numbers may be formed that are odd numbers?

A. 1000
B. 450
C. 500
D. 360

28. The numerals from 2 through 21 are written on separate slips of paper, and the slips are placed in a box. One slip is drawn at random. The probability that the numeral on the slip names a number which is divisible by 7 or is a prime number is

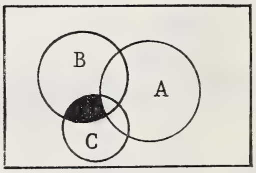
A. $\frac{11}{20}$
B. $\frac{10}{19}$
C. $\frac{10}{20}$
D. $\frac{11}{19}$

29. Solve for n, if $\dfrac{(n)_4}{\binom{n-1}{3}} = 60$

A. 360
B. 20
C. 10
D. 240

30. The shaded part of the Venn diagram represents

A. $(C - A) \cap B$
B. $(B - C) \cap C$
C. $(B \cup C) - A$
D. $(B \cap C) \cap A$



31. The system of equations $x = 2y$, $y^2 \leqq 16 - 4x^2$ will have

A. two solutions
B. four solutions
C. an infinite number of solutions
D. no solution

32. There are 20 tickets in a box. Two are blue. What is the probability that a man drawing two tickets holds exactly one blue ticket?

A. $\frac{18}{95}$
B. $\frac{9}{95}$
C. $\frac{77}{95}$
D. $\frac{1}{20}$

${}_{20}C_2 = \dfrac{\overset{10}{\cancel{20}} \times 19 \times \cancel{18!}}{\cancel{2}! \times \cancel{18}} = 190$

FOR ROUGH WORK

(No marks given for work in this space)

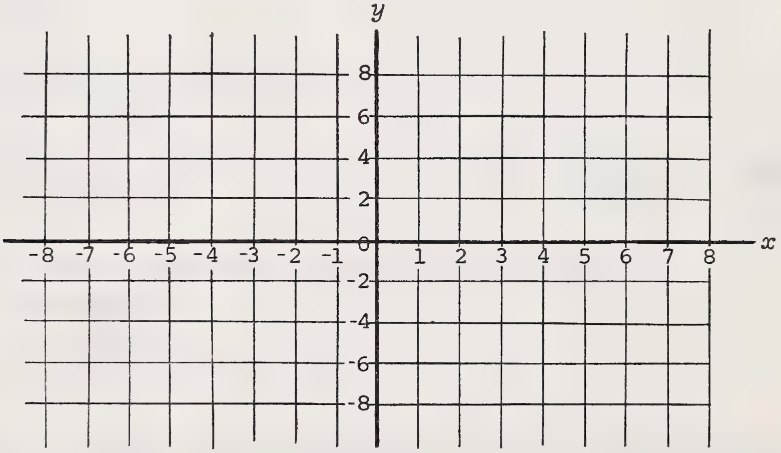
Values

SECTION B

Complete solutions for questions 33-43 inclusive must be shown in the spaces provided below each question in the booklet.

3 **33.** Determine whether $3i$ is a root of $x^3 - (5 + 3i)x^2 + (6 + 15i)x - 18i = 0$

2 **34.** (a) Sketch the graph of the relation $y = \sqrt{x^2 - 4}$, $x \in R$



2 (b) State the domain of the above relation.

1 (c) State the range of the relation.

FOR ROUGH WORK

(No marks given for work in this space)

Values

4 **35.** Solve the system: $y^2 - 3xy = 4$ and $3x - 2y + 5 = 0$

$y^2 - 3xy = 4$

$3x - 2y + 5 = 0$

2 **36.** Prove $(n)_{r+1} = (n - r) \cdot (n)_r$

3 **37.** Find and simplify the middle term in the expansion of $\left(\frac{2a}{3} - \frac{3}{2a^3}\right)^6$.

FOR ROUGH WORK

(No marks given for work in this space)

=

middle term

[OVER]

Values

3 **38.** A is the event that a 2 appears on either die when a pair of dice is tossed.
B is the event that the sum of the two die faces is 4.

Determine whether or not the two events are independent.

3 **39.** A box contains 7 tickets numbered 1 to 7 inclusive. If 3 tickets are drawn from the box, one at a time, determine the probability that they are alternately odd, even, odd; or even, odd, even.

4 **40.** If the sum of the first 3 terms of a geometric series is 63 and their product is 1728, find the first term.

Speech

Sociology

FOR ROUGH WORK

(No marks given for work in this space)

Values

3 **41.** If the sum of the first 10 terms of an arithmetic series is 500, and the sum of the first 24 terms is 1872, find the first two terms.

⑭

5 **42.** There are 20 members in a club for which the dues are $4.00 per member. To encourage recruiting of new members, the executive committee makes a rule that for every member above 20 in the club, the dues for all members shall be reduced 5¢. What must the total membership be for maximum receipts in the club treasury?

LB 3054 C2 D419 1969 MATH-30
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FOR ROUGH WORK

marks given for work in this space)

LB 3054 C2 D419 1969 math.30
Departmental examinations,
[grade 12] 1969. -

39780798 CURR HIST

Values

3 **43.** By inductive reasoning, predict the sum to n terms of this series:

$$1 + 2 + 2^2 + 2^3 + 2^4 + \dots + 2^{n-1} + \dots$$

3 **44.** A man saves \$2000 each year and deposits this amount at the end of each year in a savings fund which pays interest at 6% per annum compounded semi-annually. Write in compact form, an expression which will determine the accumulated amount of this annuity after the 8th deposit has been made.